

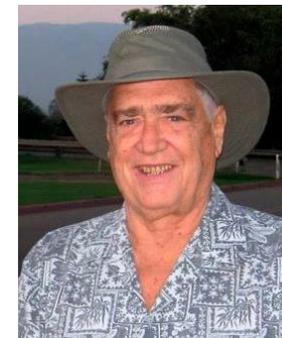
Geographic Information Systems (GIS) use in Public Health

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Epidemiologist/GIS Coordinator
Office of Health Assessment and Epidemiology
Epidemiology Unit



Why use GIS?

- To visualize, understand, question and interpret data
- To *reveal spatial and temporal relationships, patterns and trends*
- Facilitates the integration and analysis of data from different sources for better decision-making
- Tobler's First Law of Geography
"Everything is related to everything else, but near things are more related than distant things"
- Waldo Tobler





Why use GIS in Public Health?

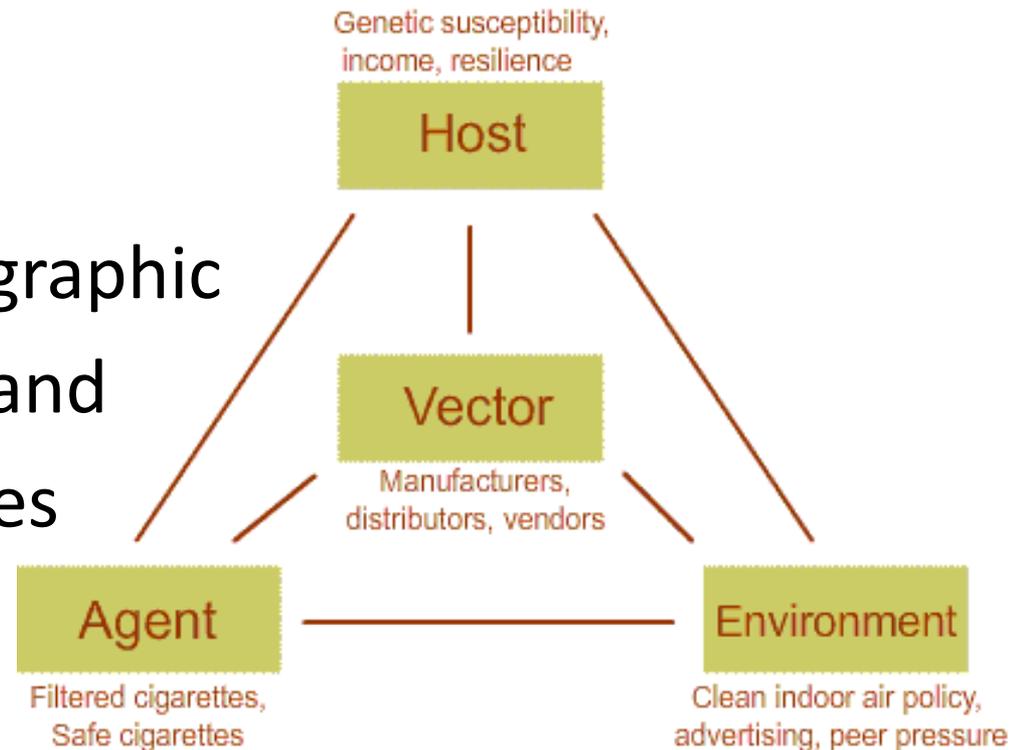
Epidemiology

- The basic science of public health
- *Epi* – means “upon”
- *Demos* – means “people” as in “democracy”
- *Logos* – “the study of”
- *“the study of what is upon the people”*

- Definition (Last, JM)
 - The study of the distribution and determinants of health-related states or events in specified populations and the application of control of health problems

Why use GIS in Public Health?

- To reveal relationships, patterns and trends about the interaction between host, agent, vector and the environment
- Epidemiology Triad
- Demographic and Geographic characteristics of host and pathogenic communities encourage and inhibit disease



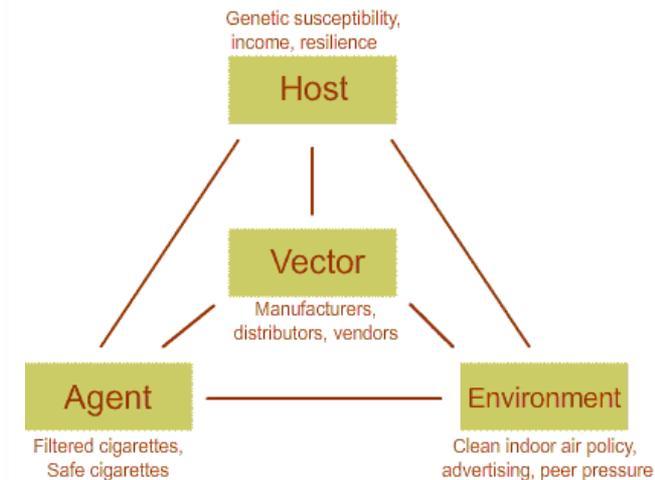
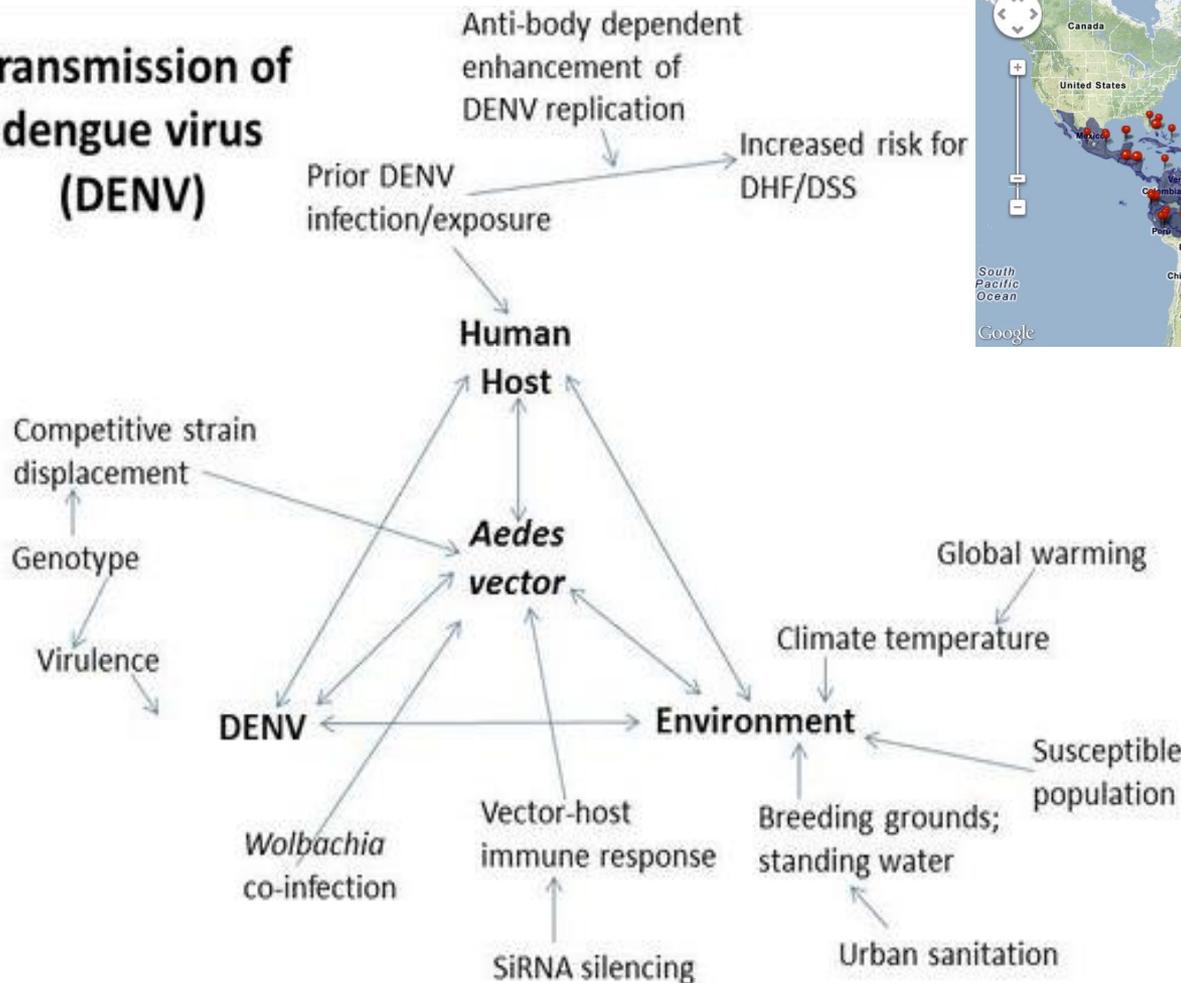
GIS in Public Health: Dengue



[Visit the CDC Dengue Page](#)



Transmission of dengue virus (DENV)





2014 Ebola Outbreak

[Subscribe](#) [RSS](#)

Zoonotic niche map



Map data ©2014 Basarsoft, Google, INEGI, Inav/Geosistemas SRL, ORION-ME Terms of Use

TIMELINE PROJECTION

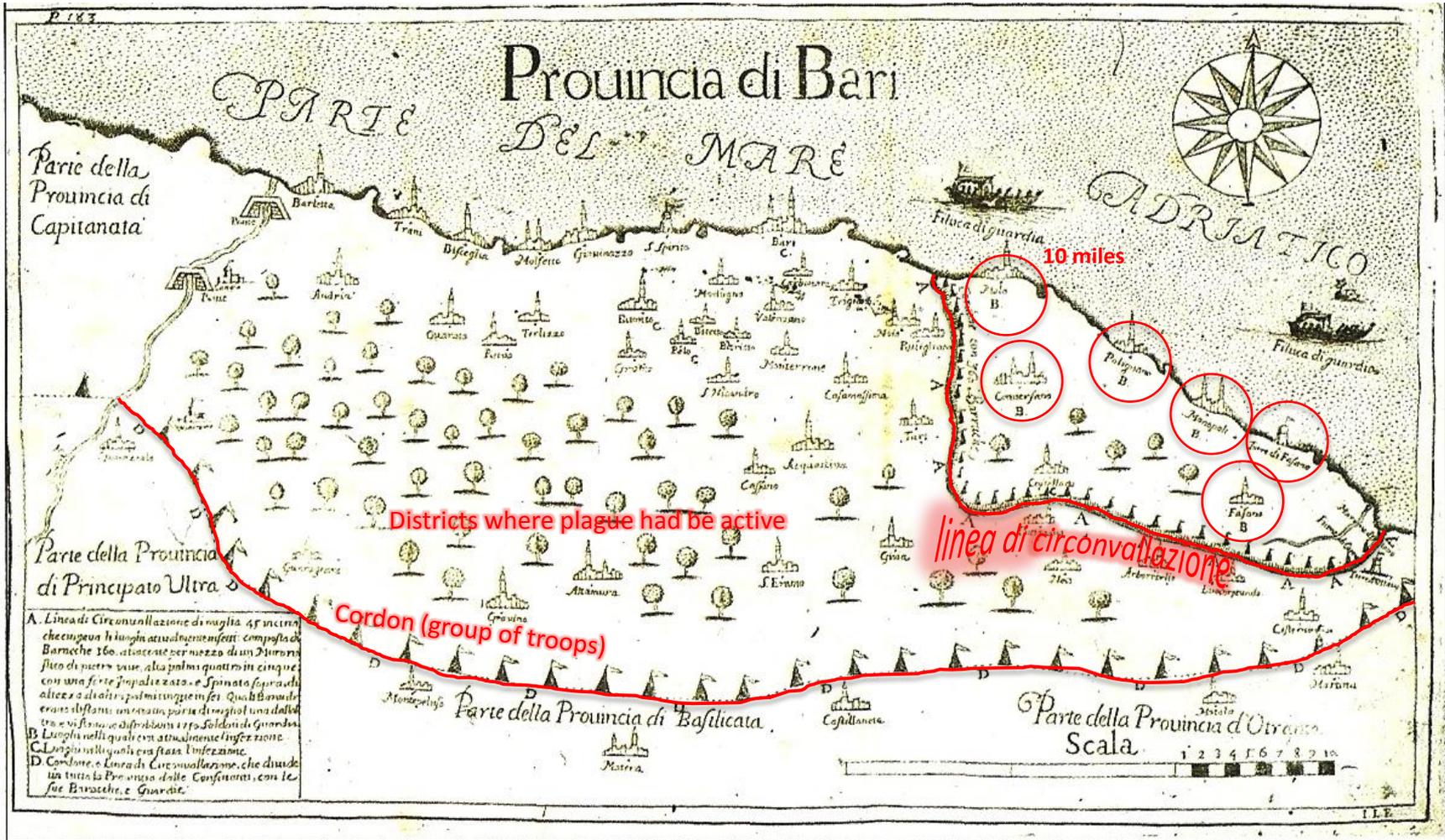




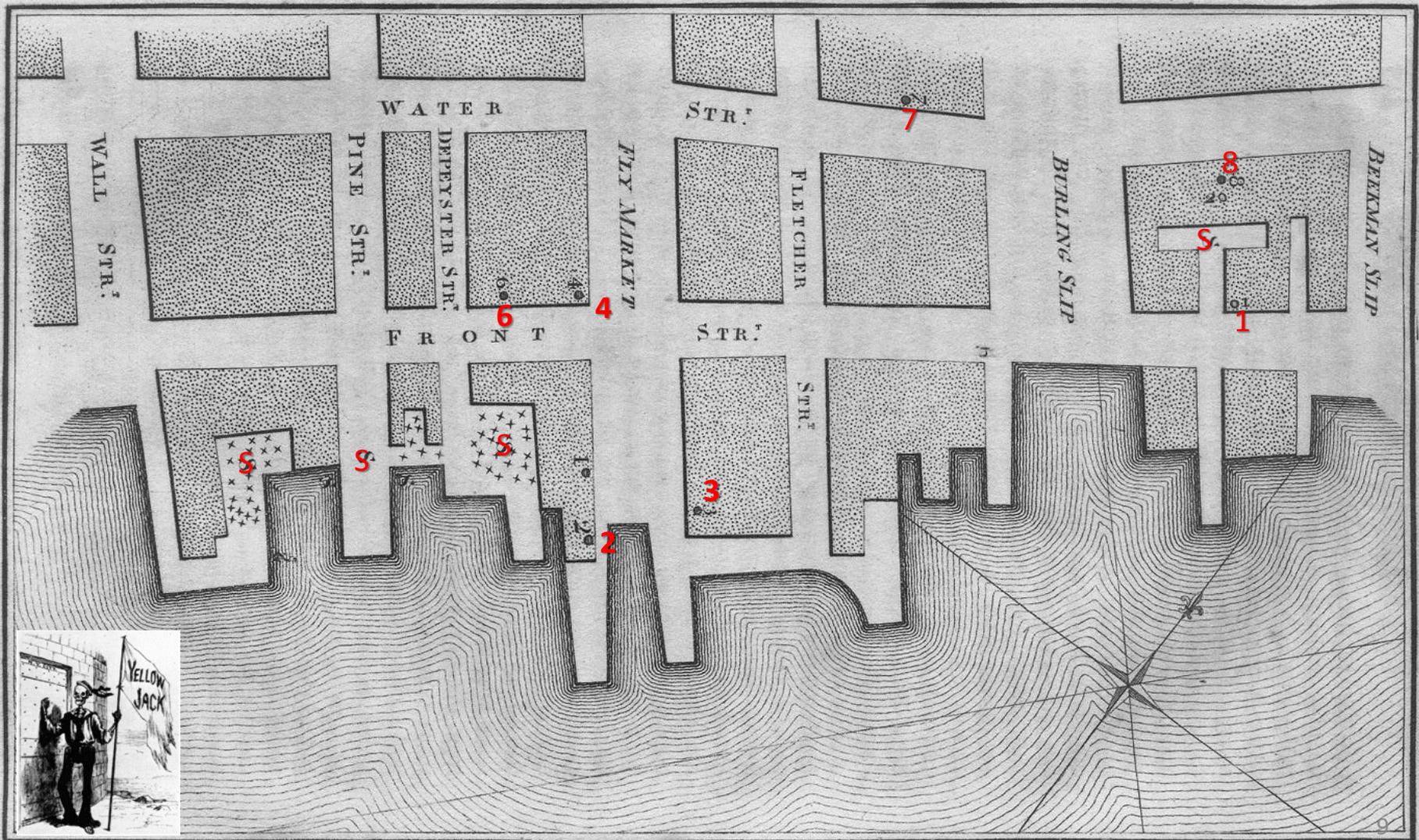
Medical Mapping Examples



Arrieta: Bubonic Plague (Bari, 1694)

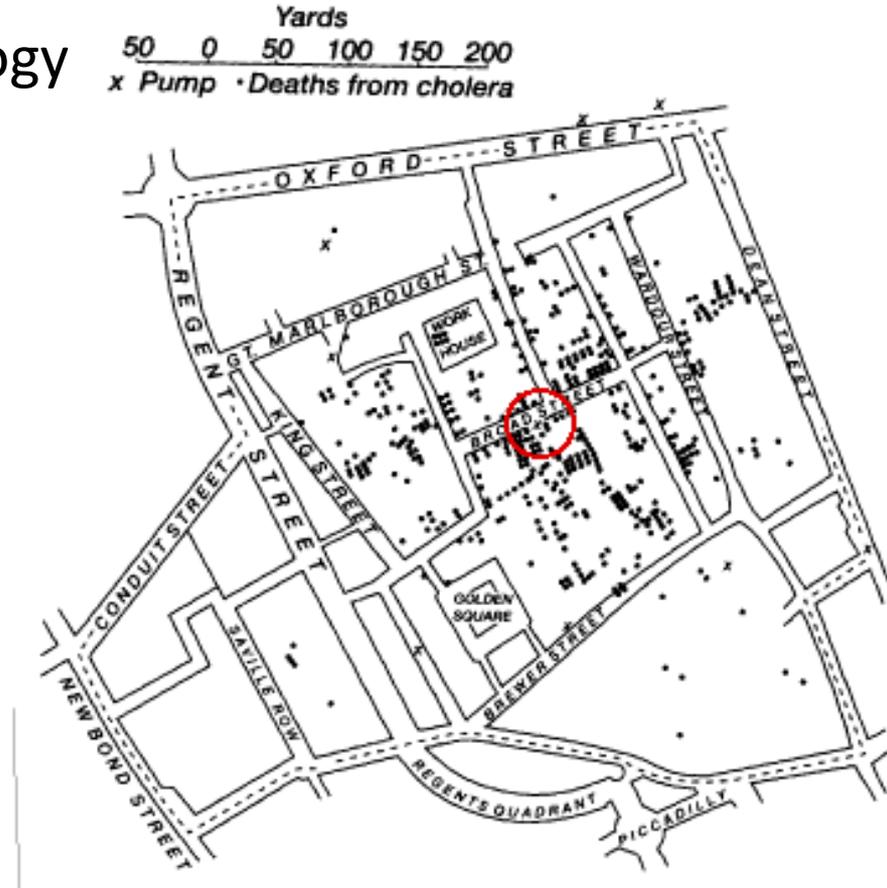
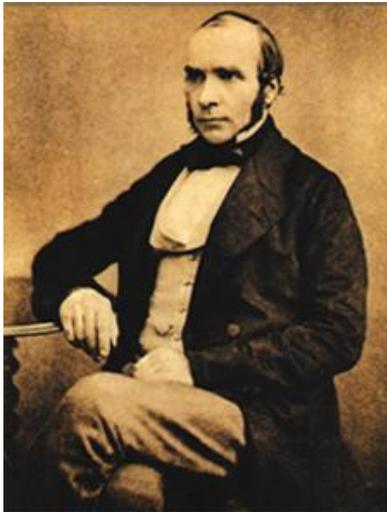


Seaman: Yellow Fever (New York, 1798)



John Snow and Spot Maps (1854)

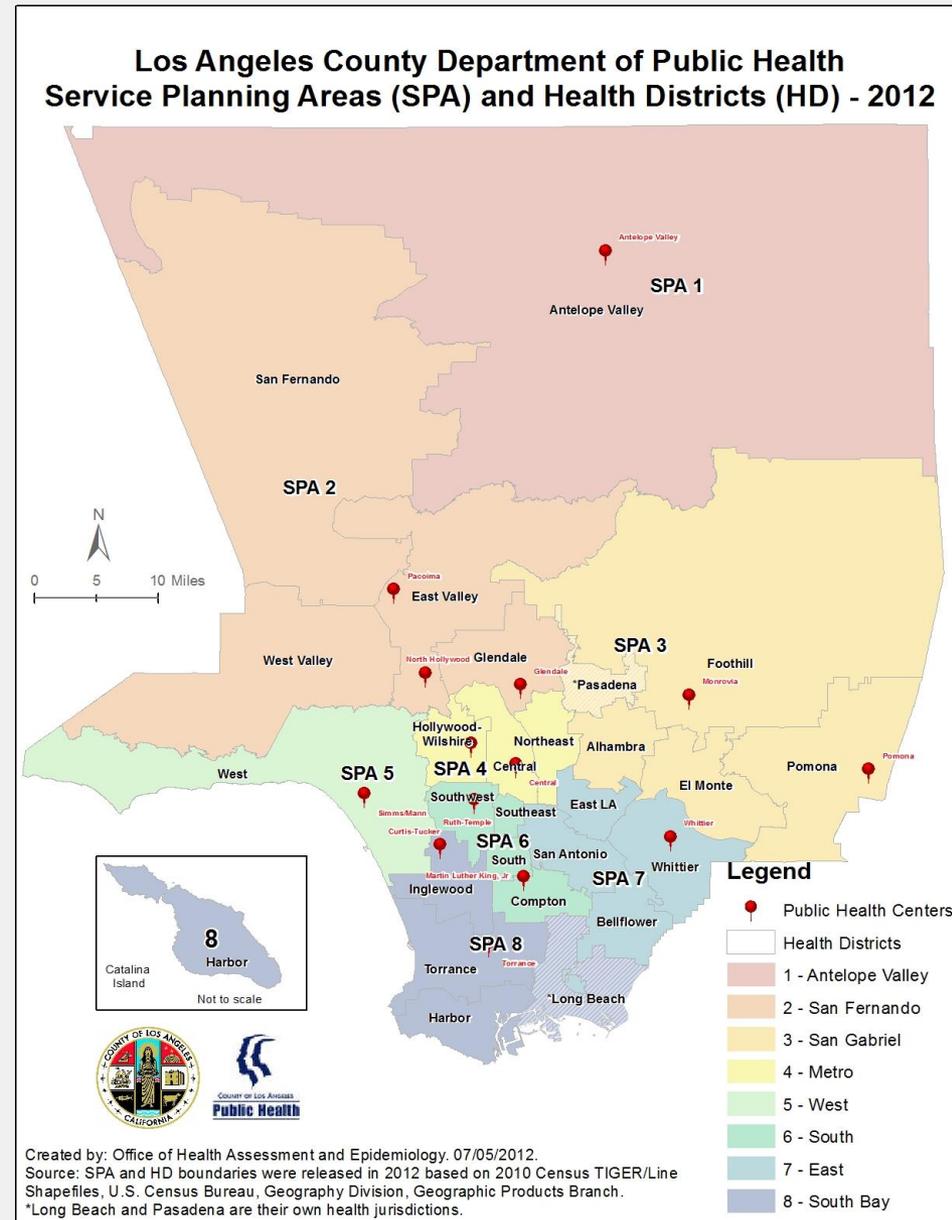
- “Father” of Modern Epidemiology
- Cholera
- London Broad Street Pump
- Chlorine in Water





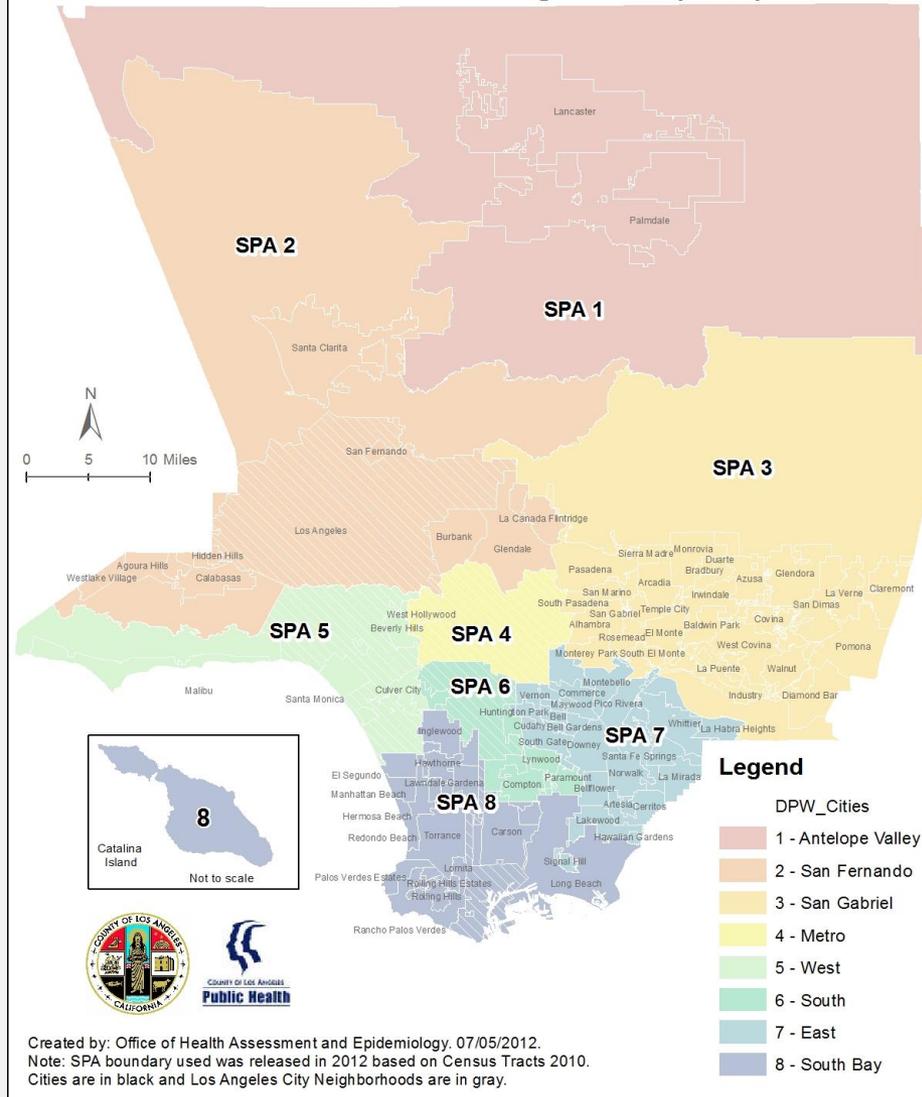
GIS use in Los Angeles County Department of Public Health

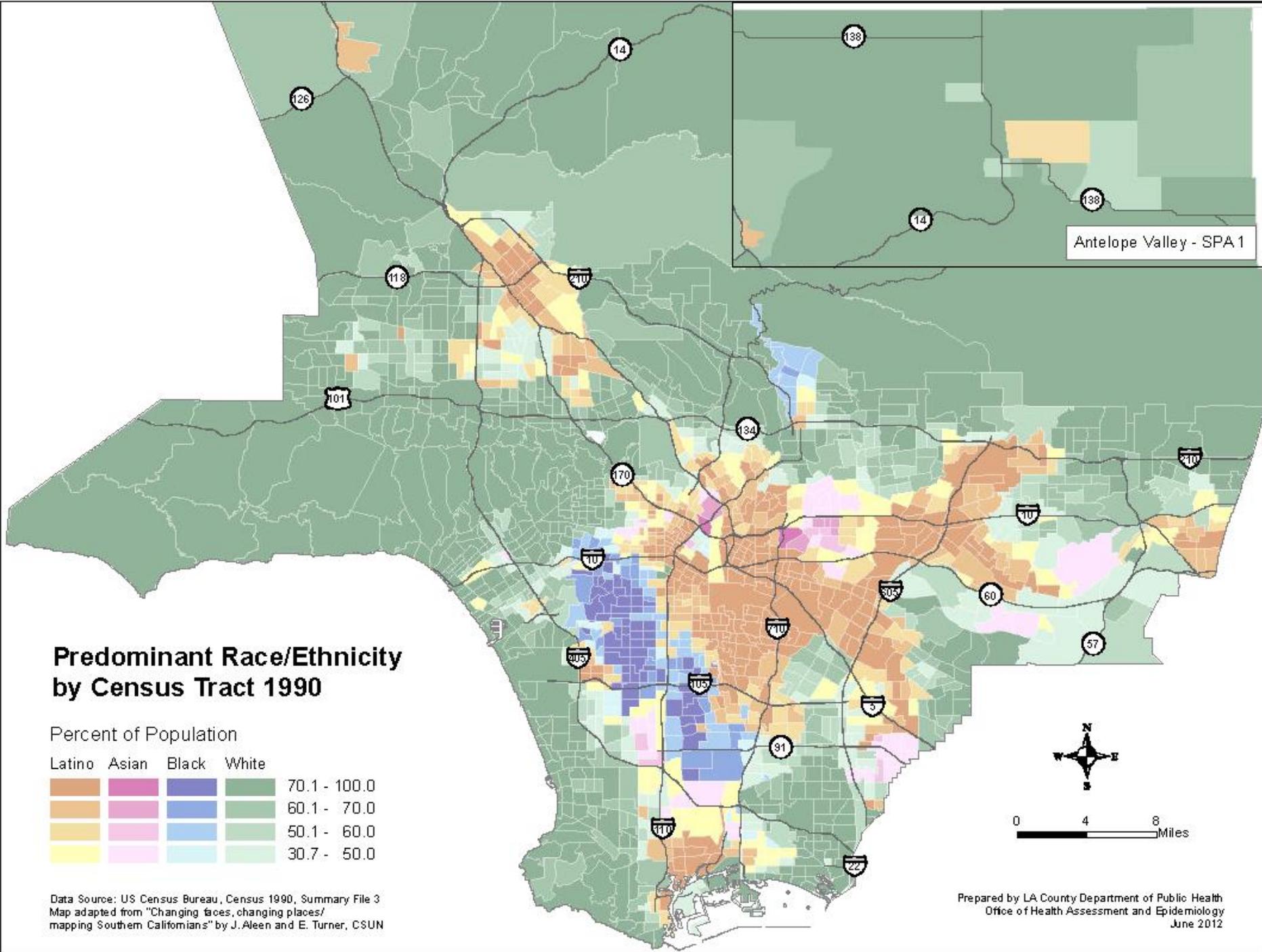
- 8 Service Planning Areas (SPA)
- 4 Area Health Officers
 - One per 2 SPAs
- 26 Health Districts (HD) with the 8 SPAs
 - Built upon Census Tracts
- 14 Public Health Centers (PHC)





Los Angeles County Department of Public Health Cities and Service Planning Areas (SPA) - 2012



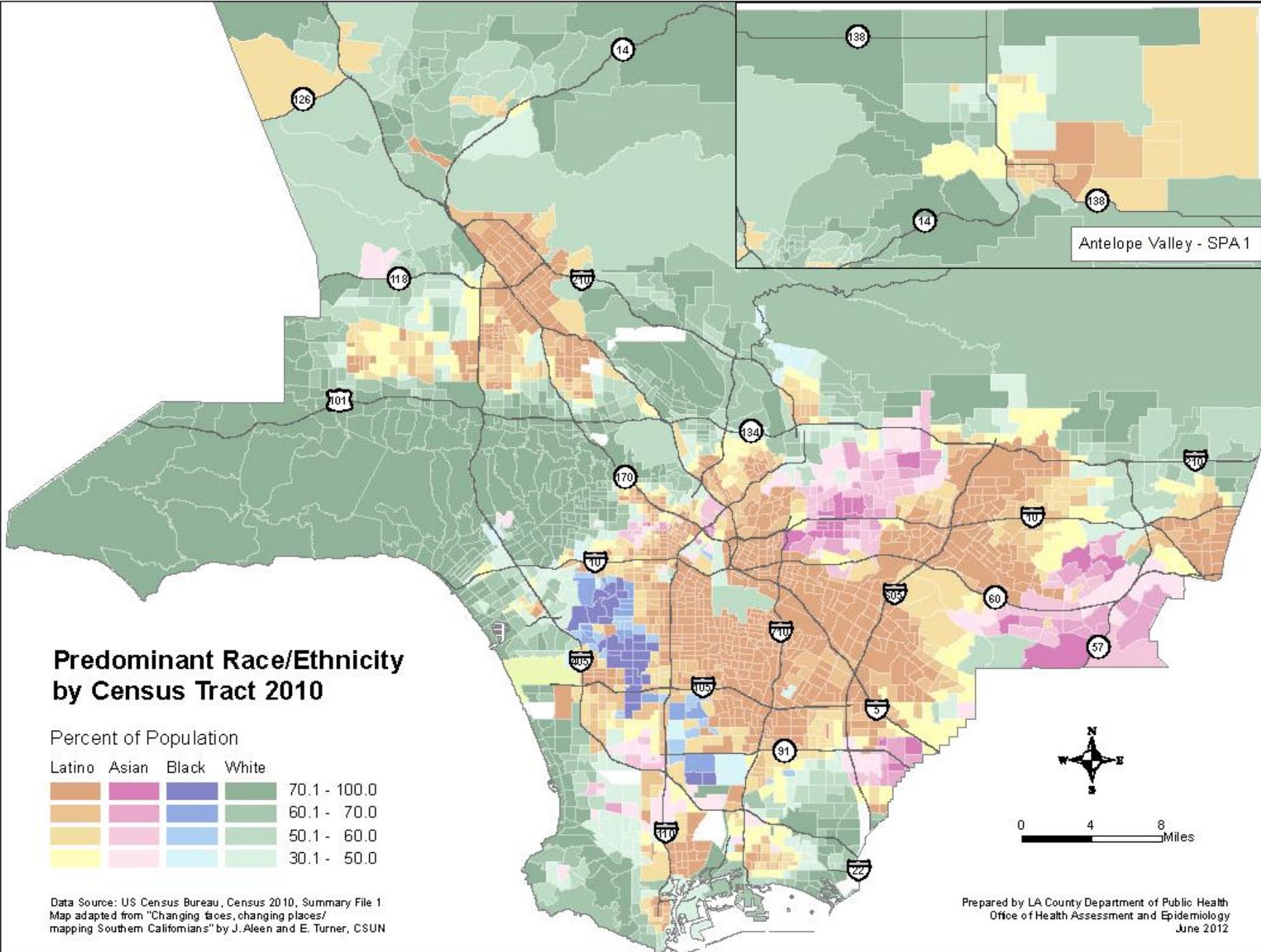


Predominant Race/Ethnicity by Census Tract 1990

Percent of Population

Latino	Asian	Black	White	
Dark Orange	Dark Pink	Dark Blue	Dark Green	70.1 - 100.0
Light Orange	Light Pink	Light Blue	Light Green	60.1 - 70.0
Yellow-Orange	Light Pink	Light Blue	Light Green	50.1 - 60.0
Yellow	Light Pink	Light Blue	Light Green	30.7 - 50.0

Data Source: US Census Bureau, Census 1990, Summary File 3
 Map adapted from "Changing faces, changing places/
 mapping Southern Californians" by J. Aleen and E. Turner, CSUN



Predominant Race/Ethnicity by Census Tract 2010

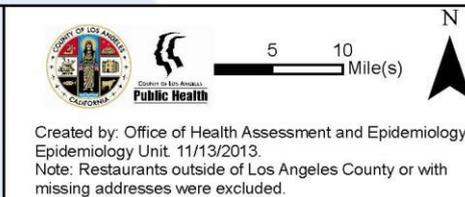
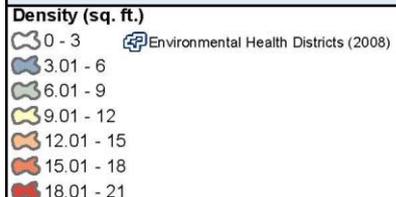
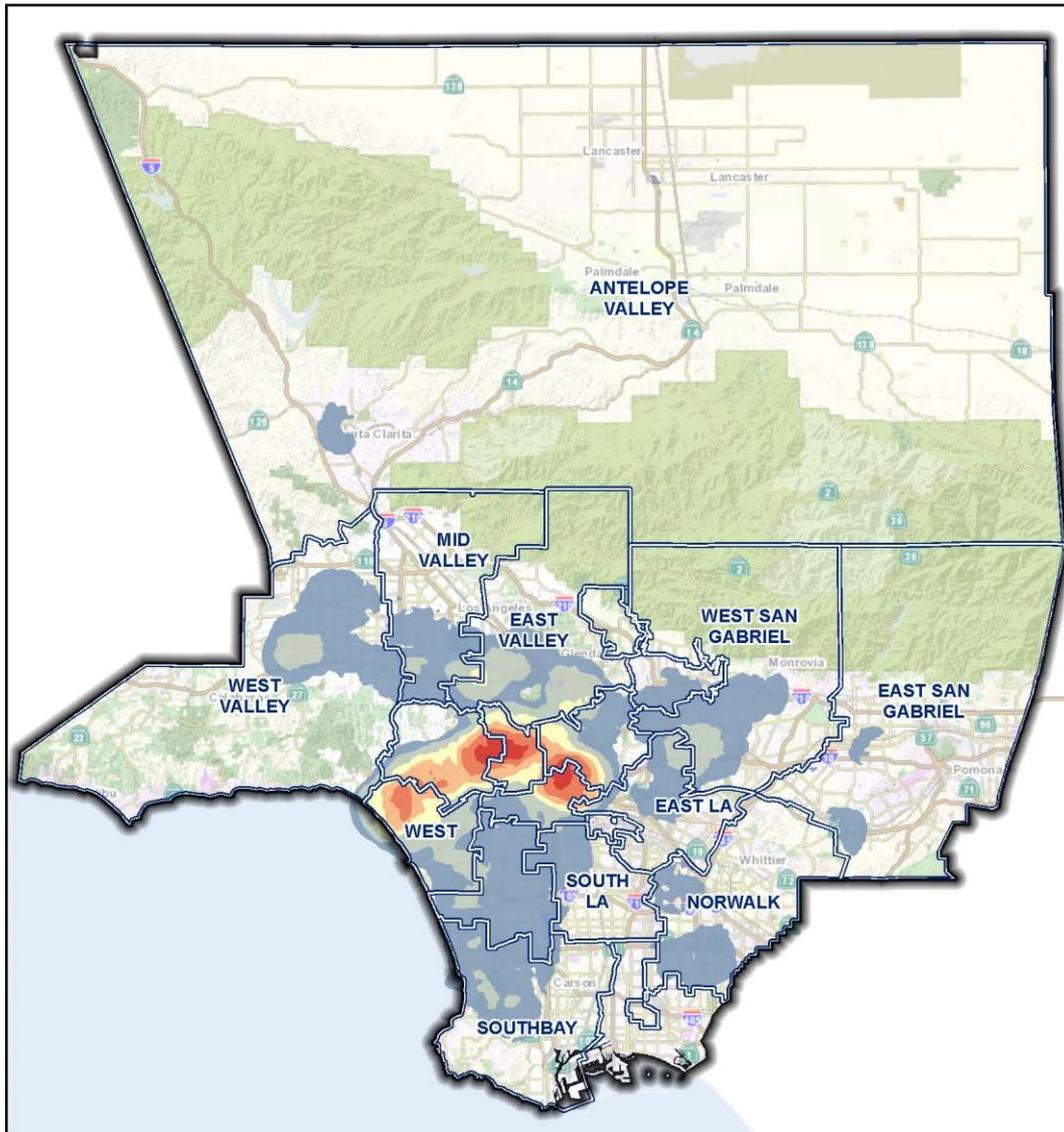
Percent of Population

Latino Asian Black White

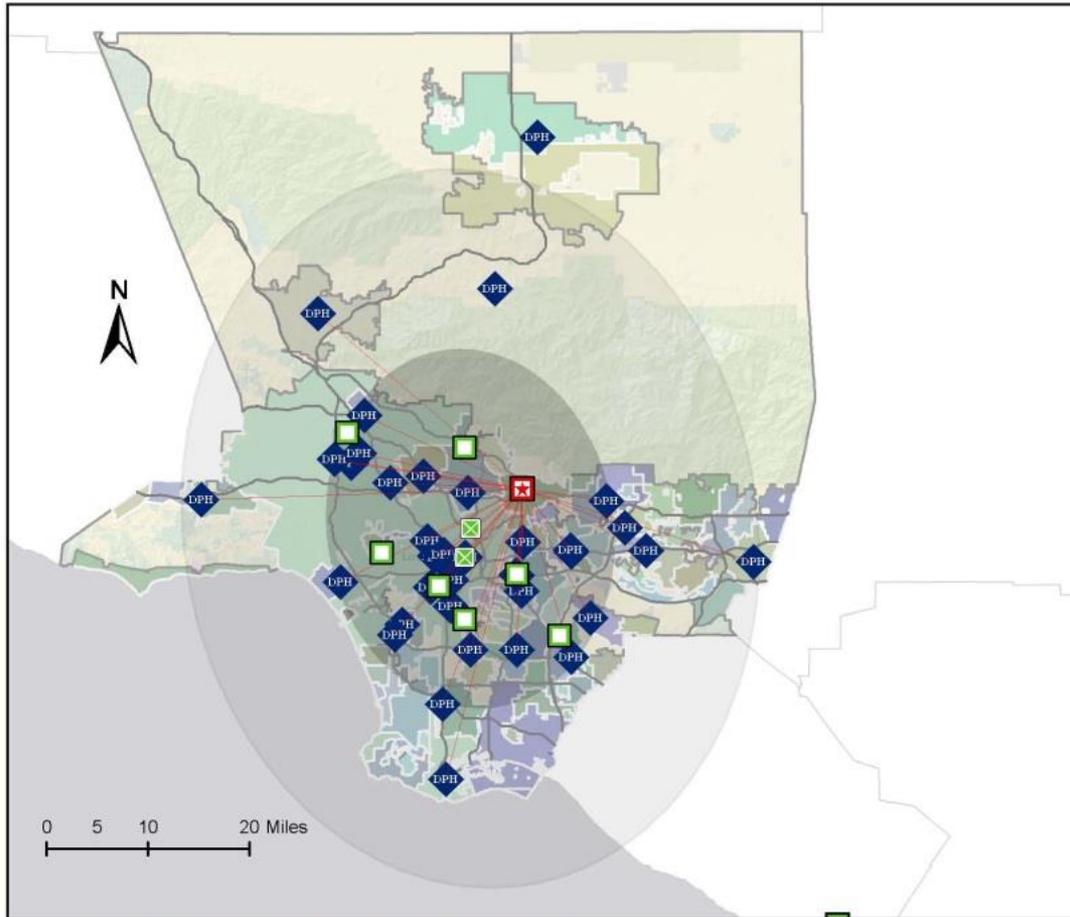
Orange	Pink	Purple	Green	70.1 - 100.0
Light Orange	Light Pink	Light Purple	Light Green	60.1 - 70.0
Yellow-Orange	Light Pink	Light Blue	Light Green	50.1 - 60.0
Yellow	Light Pink	Light Blue	Light Green	30.1 - 50.0

Data Source: US Census Bureau, Census 2010, Summary File 1
 Map adapted from "Changing faces, changing places/
 mapping Southern Californians" by J. Aileen and E. Turner, CSUN

Prepared by LA County Department of Public Health
 Office of Health Assessment and Epidemiology
 June 2012



- Results consistent with Study that showed three LA restaurant hubs
- Who is more likely to complain?
- First time these data were “spatially enabled”



- Candidate
- Required
- Competitor
- Chosen
- DPH Facilities
- 90% of Facilities (1 Std Dev*)
- 95% of Facilities (2 Std Dev*)

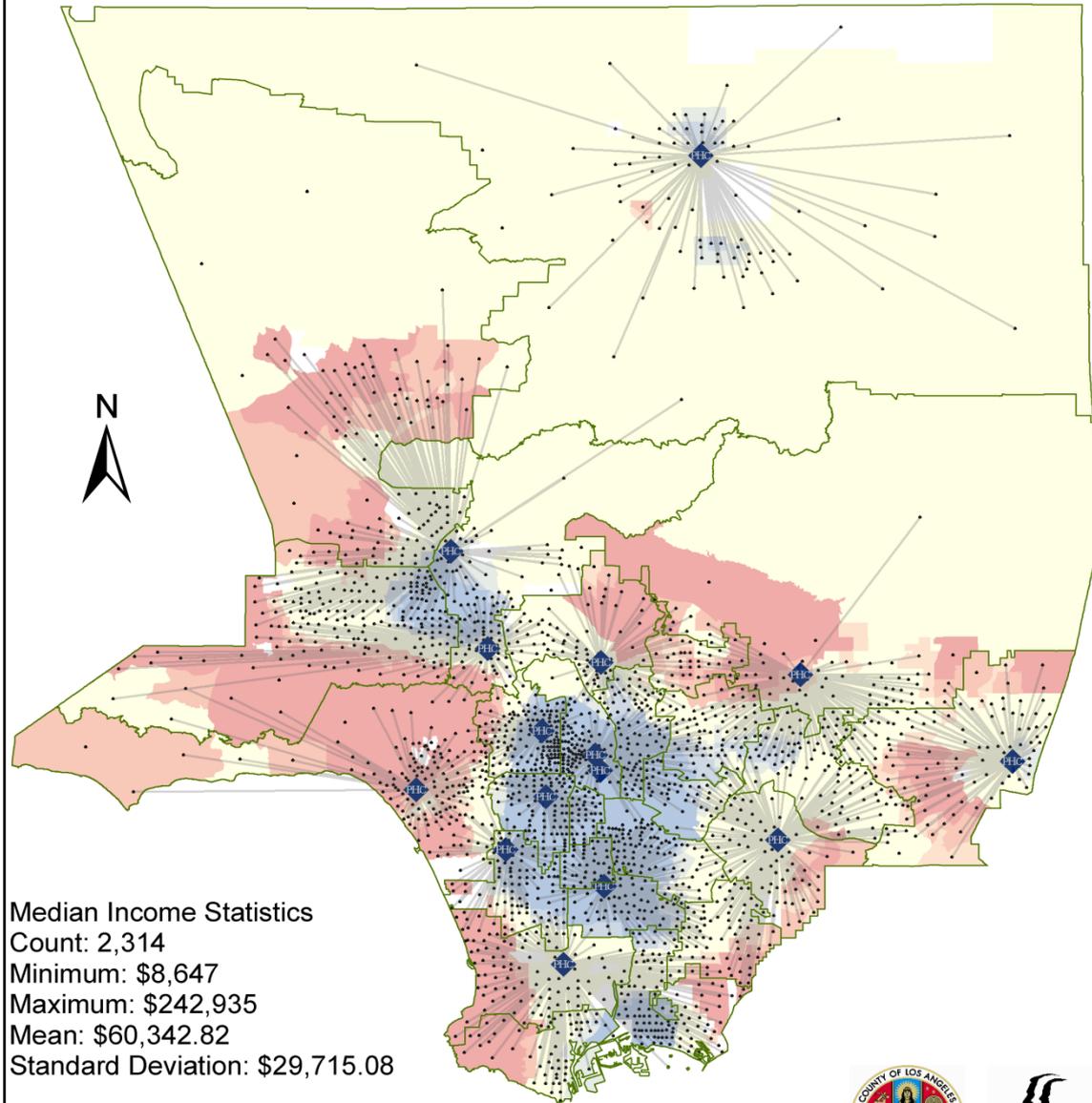
Created by: Office of Health Assessment and Epidemiology. 12/13/12.

*Standard Deviation

Results: Excluding the Median and Mean Centers, and proximity to the 40 DPH Facilities (using Location-Allocation) yielded that Pasadena was the Chosen Location.

- Eliminating downtown LA as a candidate
 - Pasadena location a good alternative?

Census Tract Proximity to Public Health Centers and Hot Spot of Median Income

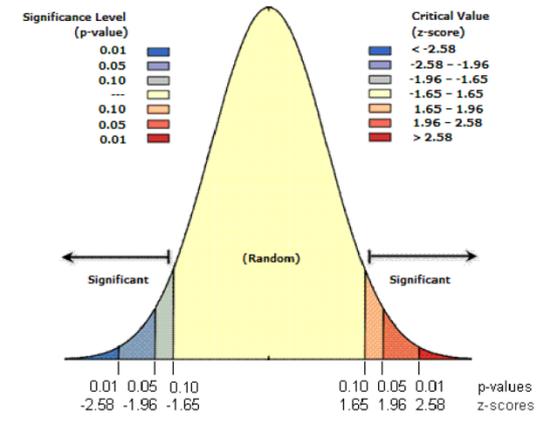


- Public Health Centers
- Census Tract Centroid (2010)
- Health Districts (2012)
- Routes

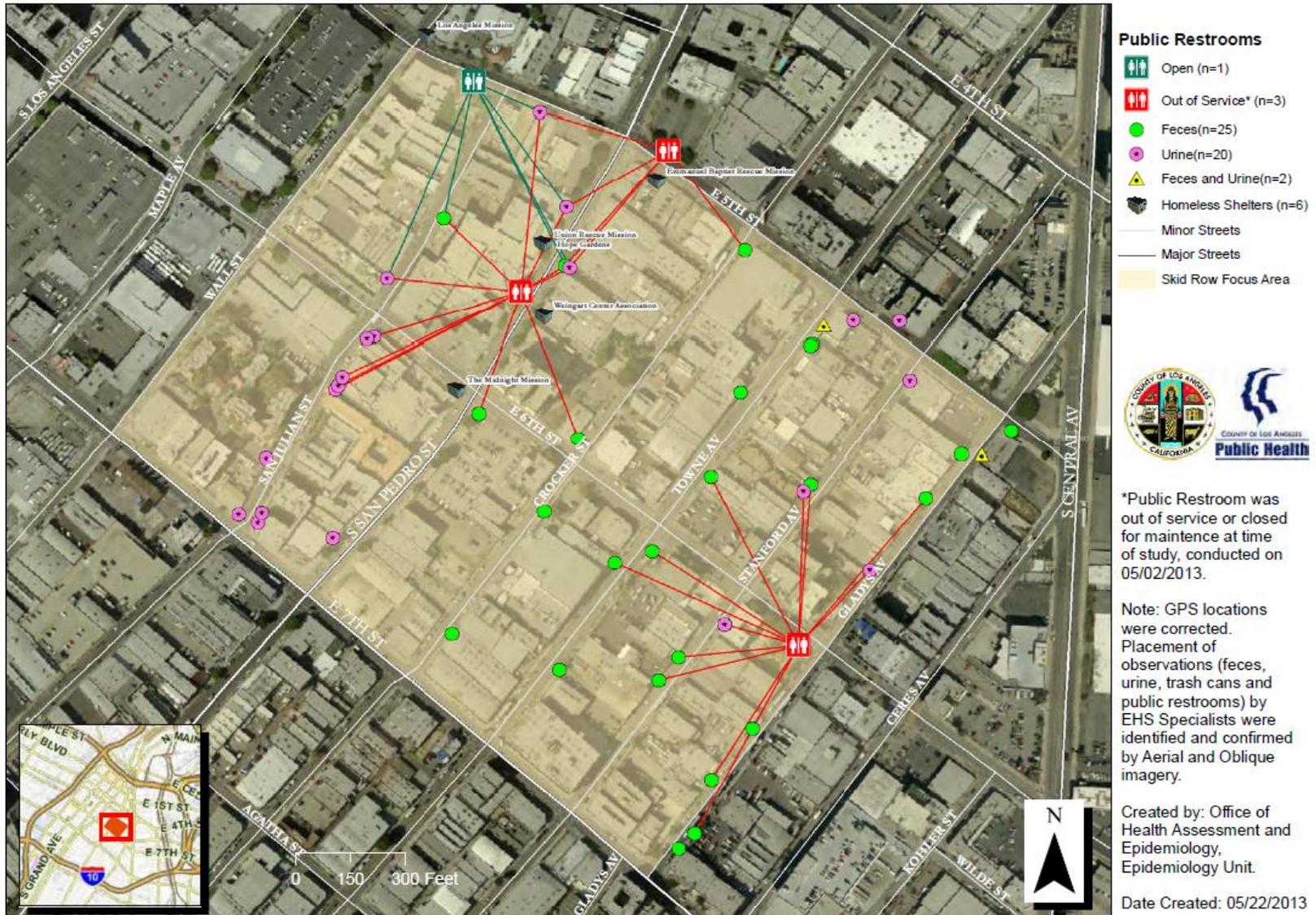
HotSpot: Median Income

Gi_Bin

- Cold Spot - 99% Confidence
- Cold Spot - 95% Confidence
- Cold Spot - 90% Confidence
- Not Significant
- Hot Spot - 90% Confidence
- Hot Spot - 95% Confidence
- Hot Spot - 99% Confidence



Attachment IVa: Stool and Urine samples within 600 feet of a Public Restroom



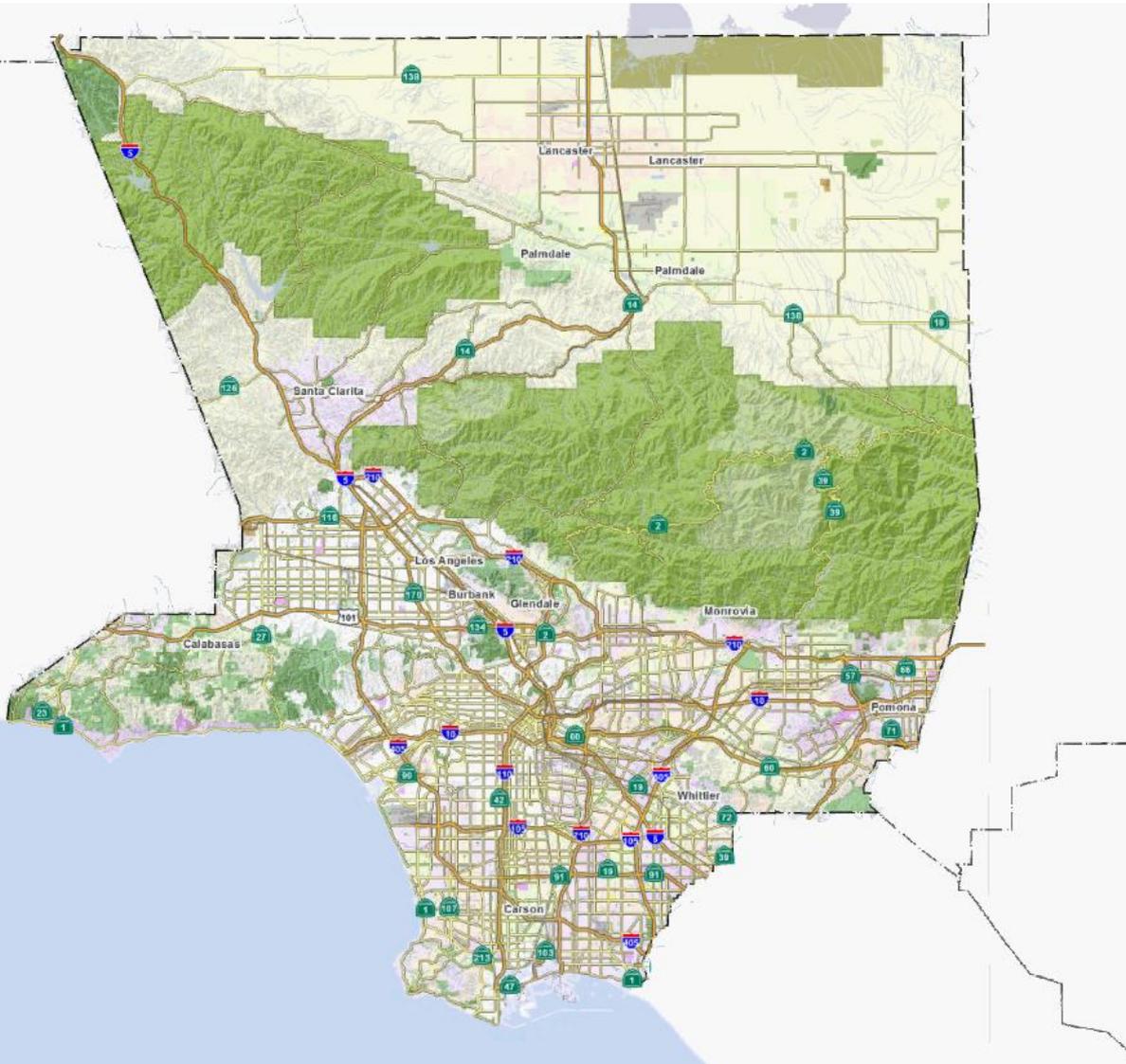
WNV + Animal Distribution

Legend

WNV+ Birds

Year

-  2008
-  2009
-  2010
-  2011
-  2012
-  Mean Center
-  Median Center
-  Standard Devotional Ellipse

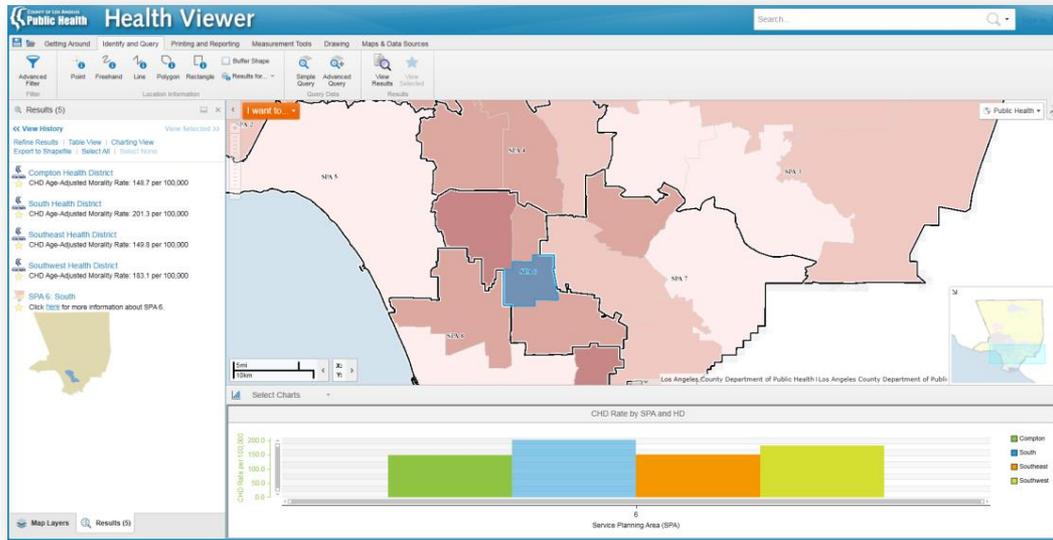




Web GIS Application



LA County Health Viewer



- Added functionality
- New/Updated data
- Latitude Geographics
 - Geocortex Essentials
 - Geocortex Viewer for Silverlight

Geocortex® | by Latitude Geographics®



Microsoft®
Silverlight™

Think Spatially!



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<https://www.linkedin.com/profile/view?id=273605976>